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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 16

Application Number: 09/437,226
Filing Date: November 10, 1999
Appellant(s): TULLOCH ET AL.

Stanley C. Spooner
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 04/11/2003.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Invention

The summary of invention contained in the brief is deficient because the explanation is not concise and failed to define claims involved in the appeal. Explanation also failed to refer to the specification by page and line number.

Method steps of fig. 3 explain the invention as claimed. Inspecting integrity of insulation of wire or cable are disclosed at pages 7-10 of the disclosure, wherein, a current flows through a loom 1 (wires or cables 2) using electrical circuits (lines 18-21 of page 7), a dissipated heat from the loom is detected by camera 5 and displayed on monitor 6 as a thermal image along the length of the loom and provides a datum values (lines 22-25 of page 7). The amount of electrolyte fluid 11 (fig. 1b) from spray dispenser 10 (fig. 1b) to be sprayed on the loom 1 (fig. 1b and 2a) is dependent upon the datum values of the heat emission i.e. as too much electrolyte could cause a short circuit and

too little may not allow a leakage current to flow, so damage may not be detected in areas of the loom hidden from direct view (third paragraph of page 10). After spraying electrolyte on to the loom 1, which causes leakage current to flow between adjacent damage sites 13-14 on the loom 1, the camera 5 is again passed over the length of the loom to detect heat emanating (fig. 2b) from the loom and can allow detection of damaged sites (fig. 2b-2c) undetectable without the electrolyte (last two paragraph on page 10).

Also, explanation at page 3 of the brief "While continuity along the wire can be tested easily, the integrity of the insulation cannot so easily be tested" wherein *"continuity along the wire can be tested"* has no support in the appellant's disclosure. Similarly explanation on page 4 of the brief "The amount heat radiated by the wire ... is proportional to the thickness of the insulator and thus partially damaged insulation in wires" wherein *"heat ... is proportional to the thickness of the insulator"* has no support in the appellant's disclosure.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

The rejection of claims 1-25 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5,574,377	Marquez-Lucero et al.	11-1996
5,637,871	Piety et al.	06-1997

"Development of thermographic NDT for the damage inspection in carbon fiber reinforced plastics" by Ogura et al. June 1996. American Soc. Nondestructive Testing, Columbus, OH. page 420-425.

"Aircraft Electrical Wet-Wire Arc Tracking" by Cahil et al. Aug. 1988. Federal Aviation Adm. Tech. Center, NJ 08405. 24 pages.

(10) Grounds of Rej ction

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-2, 4-7, 12-14 and 16-25 are rejected under 35 U.S.C. 103(a). This rejection is set forth in prior Office Action, Paper No. 12, and Pages 2-5.

Claim 15 is rejected under 35 U.S.C. 103(a). This rejection is set forth in prior Office Action, Paper No. 12, and Page 6.

Claims 3 and 8-11 are rejected under 35 U.S.C. 103(a). This rejection is set forth in prior Office Action, Paper No. 12, and Pages 6-7.

(11) Response to Argument

Appellant's arguments commence on page 6, Section VIII.

(A1) Under sub-section 1 (i.e. VIII-1), with regards to the Cahill reference appellant's argues that, Cahill does not disclose "method for inspecting the integrity of insulation" because testing starts with non-integral (due to intentional cuts in insulation of wires) insulation, in order to promote leakage current to determine their resistance to thermal degradation.

Examiner respectfully disagrees for these reasons: Cahill's method for testing the insulations requires passing a current through wires and application of electrolyte fluid, in order to promotes leakage current to determine their resistance to thermal degradation. Here, Cahill's method to test different insulation of wire and appellant's method to inspect the integrity of insulation is same. Also, Cahill's insulation has intentional cut whereas appellant's insulation has damage (element 13, 14 of fig. 2) due to impact of a tool during installation of wires. In both cases, a defect exists and they are

being tested. The defects of the prior art having been intentionally created in no way detract from the teaching of the method and of testing. Appellant also discloses conduction of leakage current between damage sites (13 and 14 of fig. 2) via electrolyte fluid (amendment C8, paper no. 8).

Hence, if integrity of the insulation is broken or varies (due to intentional cutting) it directly affects measurement of leakage current and thus thermal degradation (caused due to cut in the insulation of wire and passing a current to wire after application of electrolyte fluid on insulation of the wire) of the insulation of the wire exactly as claimed in claim 1, i.e. passing a current through wire or cable, applying a fluid having electrolyte properties to said wire or cable, and then detecting the intensity of heat emanating from said wire or cable. Therefore, it is clear to this examiner that Cahill does disclose a method for inspecting the integrity of insulation by detecting the intensity of heat emanating from the said wire or cable as claimed (see the Background of page 1 and fig. 16-17 on page 17), because damage to the insulation, intentional or accidental alike, can be detected or inspected as disclosed by Cahill.

Furthermore, the recitation "method for inspecting the integrity of insulation" occurs in the preamble. A preamble generally does not distinguishes a claim over prior art where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). More importantly, the body of appellant's claims

set forth method steps (i.e. application of current to wire, applying a fluid having electrolytic property and detection of heat intensity) that are identically disclose in Cahill. Since all of the method steps are disclosed, the preamble cannot distinguish a claim over prior art as said earlier. Furthermore, since all of the method steps are disclosed any functionality or intended use would be inherent.

(A2) Appellant's further argues at pages 6-21 of appeal brief that: 1) Examiner has ignored the fact that Cahill requires the cutting of each of the wires insulation so as to expose the wire themselves; 2) the Examiner mischaracterizes Cahill as a "method for inspecting the integrity of insulation." Cahill actually and intentionally cuts away or breaches the insulation on the wires under test and therefore starts with a known non-integral insulation and tests the effects of a breach in insulation on a wire bundle; and 3) Because Cahill intentionally breaches the integrity of the insulation under test, it cannot be considered a method for inspecting integrity of insulation. Examiner disagrees with appellant's assertion for the same reason as stated in section 11(A1) above.

The examiner further submits that any intentional cut in the wire changes the integrity of the wire and hence affects the measured parameters such as leakage current and thermal degradation. Therefore, even when the integrity is breaches, still Cahill has to inspect and measure the insulation as shown by the measurements in Table 1-4 and fig. 3-14 with the same method steps as in claim 1, i.e. passing a current through wire or cable, applying a fluid having electrolyte properties to said wire or cable,

and then detecting the intensity of heat emanating from said wire or cable. Hence, Cahill does disclose the method for inspecting the integrity of insulation as stated before.

(A3) At pages 7-21 appellant's argues that, "it is concerned with the consequences of a breach in integrity ... and is not at all concerned with any method of inspecting the integrity of existing insulation". Examiner disagrees because at page 2 (under Experimental Test Setup) Cahill discloses use of wires, each about of 14 inches in length, two cuts are separated longitudinally by approximately 10 mm and Lab Sample photograph as shown in fig. 3-14 clearly teaches and/or suggest that it is inspecting integrity of existing insulation. Further, even if Cahill is, argue do, concerned with the consequences of a breach in integrity, he still teaches the claimed method as discussed above.

(A4) Applicant at pages 7-21 argues that, "Cahill does not explicitly disclose, using a thermal imaging system to detect and display the intensity of heat emanating from said wire or cable. Thus, Cahill is not concerned with a method for inspecting integrity of insulation and does not use any method of thermal imaging to detect and display heat emanating from the wire or cable." Examiner agrees with appellant's assertion that Cahill does not explicitly disclose, using a thermal imaging system to detect and display the intensity of heat emanating from said wire or cable. Cahill discloses in fig. 3-14 (lab sample photograph of wire bundle) and in fig. 15-17 (measurement of temperature) a detection of heat intensity (temperature) for inspecting the insulation of wire. Ogura reference cited by Examiner discloses thermal imaging system, see rejection under 35 USC 103(a) of the last office action (paper no. 12).

Ogura discloses heating a sample, which causes temperature distribution on the surface of the sample. Taking the thermal image of this temperature distribution on the surface to clearly identify the defect shape and size in the insulation or sample. Here, thermal image of the sample surface is/are taken with camera of fig. 2 . Cahill discloses temperature distribution on the surface of the insulation and detection of this temperature in fig. 15-17. Which means that Cahill needs thermal measurement.

Further, Cahill has lab photograph of insulation of wires in fig. 3-14. Cahill does not disclose how to get those photograph (images). Therefore, it would have been obvious to one having ordinary skill in the art to use thermal image system (camera) of Ogura with Cahill, because Ogura presents a known method of printing the thermal images with good accuracy. Therefore, examiner concludes that combination is obvious for the purpose of identifying flows and defects in the insulation from a temperature distribution on a surface of the insulation.

Furthermore, appellant's stated on page 8 that "While thermal imaging by itself is well known in the art and is used and taught in the Ogura reference, its teaching is for the entirely different reason than that in the claimed invention," Here, Ogura teaches use of thermal image system to display images of defects in the insulation (see lines 9-22 on page 422 and camera fig. 2a and 2b with display chart above the camera) and shows photograph of temperature distribution around spots of defects in the insulation (fig. 3a-3b). Hence, one of the ordinary skill in the art is motivated to modify Cahill (where measurement of the temperature is taught but not explicitly disclosed) to add or include thermal imaging system as taught by Ogura to identify flaws and defects in the

insulation. Examiner directs to section 11(A1) of this Office action for answer to argument regarding "inspecting the integrity of the insulation".

(A5) At pages 7-21 of appeal brief appellant's argues that, "Cahill is directed only to the problem of evaluating different types of insulation as to their resistance against thermal degradation caused by wet-wire arcing and is unrelated to the problem of evaluating the integrity of insulation on a wire or cable." Examiner respectfully disagrees for the same reason as stated in section 11(A1) above. Irrespective of why Cahill is interested in the problem, he teaches the method of testing the insulation integrity as claimed i.e. passing a current through wire or cable, applying a fluid having electrolyte properties to said wire or cable, and then detecting the intensity of heat emanating from said wire or cable.

(B1) In response to appellant's argument that "a brief review of the Ogura reference will show that it has nothing to do with insulated wires or cables and instead is directed to the non-destructive testing of carbon fiber reinforced panels" and "In neither of Figs. I and 2 of Ogura is there any disclosure of a general method for inspecting the integrity of insulation, nor is there any disclosure of the step of passing a current through a wire or cable or applying a fluid having electrolytic properties to the wire or cable and then using thermal imaging," examiner notes that It is true that Ogura reference has does not disclose testing with cables, but it is also true that Ogura reference uses thermal imaging system to detect flaws and defect in insulation. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed

invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Cahill discloses to provide picture of tested insulation of wires with temperature distribution on the surface of the insulation in fig. 3-17 and Ogura teaches a method for providing pictures of insulations. Therefore, it would have been obvious to one having ordinary skill in the art to use thermal image system (camera) of Ogura with Cahill, because Ogura presents a known method of providing thermal images (pictures) with good accuracy.

(C1) At 1st paragraph of page 9 appellant's explains what Marquez-Lucero reference teaches and at the 2nd paragraph appellant's argues that what Marquez-Lucero reference does not teach (i.e. has nothing to do with any method for inspecting the integrity of insulation of an insulated wire or cable etc.). Here, appellant's failed to argue about Oscilloscope. Examiner agrees with appellant's assertion that Marquez-Lucero does not teach a method of testing a cable. Examiner had cited Marquez-Lucero reference for the use of Oscilloscope (to measure the leakage current) because Cahill and Ogura references do not explicitly discloses use of the Oscilloscope to measure the leakage current. Cahill discloses use of ammeter to measure the leakage current. Leakage current is inherent to the current density at the tips of the flows for Ogura reference. Oscilloscope, as taught by Marquez-Lucero reference, can be use with combination of Cahill and Ogura, in order to measure amplitude and phase values of the leakage current to study electrical characteristic (waveform etc.) of the

insulation. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Cahill teaches ammeter to measure the current and thermal distribution on the surface of the insulation as shown in fig. 3-17. Ogura teaches use of thermal image camera in fig. 2a-2b to take thermal image of temperature distribution on the surface of the insulation. Marquez-Lucero discloses use of Oscilloscope (to display a test signal to reveal the impedance faults along the length of the cable) to measure and display a current. It would have been obvious to one having ordinary skill can replace ammeter of Cahill with Oscilloscope of Marquez-Lucero, in order to measure current with its display feature which enables lab personal or operator to determine the impedance signature of the cable under test [lines 20-31 of column 3 of Marquez-Lucero].

(D1) At 3rd paragraph of page 9 appellant's explains what Piety reference teaches and at the 4th paragraph appellant's argues what Piety reference does not teach including, any method for inspecting the integrity of insulation on an insulated wire or cable, the passage of current through wire or cable under test, application of fluid having electrolyte property to any wire or cable, nor does it specifically teach the use of its thermal imaging system for detection and display of the intensity of heat emanating from the wire or cable. Examiner agrees with appellant's assertion above. Examiner had

cited Piety reference for the teaching of a recording means (to record images displayed by the thermal image system). Cahill and Ogura references does not explicitly discloses use of recording means to record images displayed by the thermal image system. Piety reference stores and processes the thermal images in the recording means so defects can be detected by studying thermal images at any time. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Cahill records thermal distribution data/images of insulation surface on paper. Ogura uses thermal image camera to display images and is silent about storing of images in camera. In combination Cahill and Ogura does not explicitly discloses recording means to record images displayed on the thermal image system. Use of recording means as taught by Piety with thermal imaging system of Ogura is advantageous because stored data can be used to measure and study different electrical parameters including detection of defects in the insulation at any time.

(E1) Under "Discussion of the rejection" of section VIII-2, page 10 of appeal brief, Examiner disagrees with appellant's assertion about motivation to combine references. Appellant's argues that there is no motivation. Earlier in this Office action at section 11(A4) Examiner has discussed the motivation to combine (i.e. Cahill measures the heat emanating from the surface of the insulation to find defects in the insulation and

provides pictures and thermal distribution as shown in fig. 3-17. Ogura uses thermal camera to take thermal image of heat distribution on the surface of the sample to find defects, size and shape in insulation). For this reason and reason set forth at section 11(A4), 11(C1) and 11(D1), the Examiner maintains that a proper motivation has been set forth.

(F1) At third part of section VIII (i.e. VIII-3), page 11 of appeal brief, appellant's summarized three main errors:

(a) The Examiner misapprehends the teachings of the Cahill and Ogura references;

1. Cahill does not inspect -- it destructively tests wire insulation;

2. Ogura deals with CRFP panels and not wire or cables.

(b) None of the prior art references recognize the problem solved by appellants' combination of method steps;

(c) The Examiner has failed to provide any reason for combining any of the cited references;

(d) Each of the prior art references teach away from appellants' claimed method.

At pages 12-21, appellant's further argues above errors in detail, which includes similar arguments that Examiner responded earlier in this Office action. Examiner disagrees for the following reasons:

Regarding error (a)1 and similar argument found on pages 12-14 of appeal brief, In summary, examiner disagrees because: 1) Cahill discloses the claimed method and has to inspects the defects in the insulation of wires; 2) recited use is in preamble and

all of the claimed steps are met by Cahill; 3) Cahill inherently inspected integrity of wire or cable during the course of his test. Section 11(A1-A5) of this answer explain these points in detail.

Regarding error (a)2 and similar arguments found on pages 14-15 of the appeal brief, Examiner disagrees because Ogura discloses thermal image system (camera) to take thermal image of temperature distribution on the surface of a insulation to find defects and flaws in the surface of the insulation. Also see section 11(B1).

Regarding errors (b), Examiner disagrees because in combination all the references disclose method steps as claimed.

Regarding error (c), Examiner disagrees because the motivation is to detect damage, flaws or defects on the insulation of wire or cable accurately using thermal imaging system display. This has been stated in the rejection of paper no. 12 and in this answer in section 11(A4), 11(C1) and 11(D1).

Regarding error (d), Examiner again disagrees because none of the references teaches away from the claimed method. Cahill discloses method steps as claimed except for thermal image system to display heat emanating from the surface of the insulation of the wire or cable. Ogura discloses this deficiency of Cahill as stated earlier with thermal imaging system. Cahill also teaches use of ammeter to measure current, Marquez-Lucero teaches oscilloscope to measure the current signal. Cahill records its thermal distribution on paper, Ogura's camera displays thermal images but is silent about recording, and Piety discloses recording means to record thermal images.

Examiner again disagrees with appellant's assertion of arguments with references alone and in combination. Examiner directs the attention to section 11(A1-A5) to 11(E1) for response to arguments and also maintains the rejection as set forth in the last office action. At pages 16-20 of appeal brief, applicant again argues the same subject matter that appellant disagrees with.

For the above reasons, it is believed that the rejection should be sustained.

Respectfully submitted,

Paresh Patel

Aug. 22, 2003

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